3. SUMMARY OF GRIZZLY BEAR BIOLOGY

Physical Characteristics

Grizzly bears are generally larger than black bears and can be distinguished by longer, curved front claws, humped shoulders, and a face that appears concave (Figure 5). A wide range of coloration from light brown to nearly black is common. Guard hairs are often paled at the tips; hence the name "grizzly". Spring shedding, new growth, nutrition, and climate all affect coloration.

In the lower 48 states, the average weight of grizzlies ranges from 400-600 pounds for males to 250-350 pounds for females. Males may occasionally reach 800 to 1,000 pounds. Differences in body mass between males and females are influenced by factors such as age at sexual maturity, samples from within the population, season of sampling, reproductive status, and differential mortality.

Body mass is dynamic in grizzly bears and varies seasonally. During late summer and fall, grizzlies gain weight rapidly, primarily as fat when they feed intensively prior to denning. Because bears rely solely on their stored energy reserves during hibernation, this pre-denning weight gain is essential for reproduction and survival. Peak body mass generally occurs in fall just prior to hibernation. Bears metabolize fat and muscle during the denning period.

Grizzly bears are relatively long-lived, and individuals are known to have lived 40 years in the wild; a captive bear lived 47 years. In general, the oldest age classes are listed at 28 years for males and 23 years for females, although individuals can live longer. For example, in 2005, Kasworm and colleagues documented a female grizzly bear in the Cabinet Mountains that lived to be 37 years old.

Social Organization and Behavior

Adult bears are individualist in behavior and normally solitary wanderers. Except when caring for young or breeding, grizzly bears have solitary patterns of behavior. Individuals probably react from learned experiences. Consequently, two individual bears may respond in opposite ways to the same situation. Strict territoriality is unknown, with intraspecific defense limited to specific food concentrations, defense of young, and surprise encounters.

Each bear appears to have a minimum distance within which another bear or person cannot enter; any intrusion of this distance may evoke a threat or an attack. Surprise is an important factor in many confrontations involving bears and humans. A female with young exhibits an almost reflexive response to any surprise intrusion or perceived threat to her "individual distance" or that of her cubs. Defense of a food supply is another cause of confrontation between humans and bears. Bears generally defend a kill or carrion out of perceived need.

Grizzly bears of all ages will congregate readily at plentiful food sources and form a social hierarchy unique to that grouping of bears. Mating season is the only time that adult males and females tolerate one another, and then it is only during the estrous period. Other social affiliations are generally restricted to family groups of mother and offspring, siblings that may stay together for several years after being weaned, and an occasional alliance of sub-adults or several females and their offspring.

Figure 5. Know your bears identification brochure.

Habitat Requirements

In general, grizzly habitat requirements are determined by large spatial needs for omnivorous foraging, winter denning, behavior, and security cover. Large roadless areas are ideal as year round grizzly habitat. Roads can displace bears depending on tolerance of the bear. Furthermore, roads can also increase mortality risk if humans who kill bears use such roads. However, grizzly bears can and do survive in roaded areas if tolerance for their presence is high. Home ranges must include a number of

habitat types. Habitat needs vary for individual bears depending on their age and sex. These requirements may also vary annually with seasonal changes in foraging needs.

Food

The broad historic distribution of grizzly bears suggests adaptive flexibility in food habits of different populations. Although the digestive system of bears is essentially that of a carnivore, bears are successful omnivores, and in some areas may be almost entirely herbivorous. Grizzly bears must avail themselves of foods rich in protein or carbohydrates in excess of maintenance requirements in order to survive denning and post-denning periods.

The search for food has a prime influence on grizzly bear movements. Upon emergence from the den they seek lower elevations, drainage bottoms, avalanche chutes, and ungulate winter ranges where their food requirements can be met. Herbaceous plants are eaten as they emerge, when crude protein levels are highest. Throughout late spring and early summer they follow plant phenology back to higher elevations. In late summer and fall, there is a transition to fruit and pine nut sources, as well as herbaceous materials. This is a generalized pattern, however, and it should be kept in mind that bears are individuals trying to survive and will go where they best can meet their food requirements.

Grizzly bears are opportunistic feeders and will prey or scavenge on almost any available food including ground squirrels, ungulates, carrion, and garbage. In areas where animal matter is less available, roots, bulbs, tubers, fungi, and tree cambium may be important in meeting protein requirements. High quality foods such as berries, nuts, and fish are important in some geographic areas.

In the CYE and portions of the NCDE, huckleberries are the major source of late summer food for bears that enables them to accumulate sufficient fat to survive the denning period and enable females to produce and nurture cubs. On the Eastern Front, graminoids, roots and corms, and fruit had the highest percent volume and highest important values of all bear food categories of analyzed grizzly bear scat. However, mammals, sporophytes, and pine nuts were seasonally important. Throughout the region, bears also commonly feed on gut piles and animals wounded and/or lost during the fall big game hunting season. This can be an important source of protein for bears.

Cover

The relative importance of cover to grizzly bears has been well documented. Whether grizzly bears use forest cover because of an innate preference or to avoid humans is unknown. The importance of an interspersion of open parks as feeding sites, and mosaic landscapes with shrub layers associated with cover, are also important.

Forest cover was found to be very important to grizzly bears for use as beds. Most beds were found less than a yard or two from a tree. In the NCDE, researchers found the majority of radio-collared grizzly bears in the forest. It is possible that this was biased by daytime relocations; new techniques that allow locating bears 24 hours a day could change this. In the CYE, grizzly bears made greatest annual use of closed timber, cutting units, timbered shrubfields, and mixed shrub snowchutes.

Other studies have shown an avoidance of timbered cover types. In a study done in the Swan Mountains, three cover types found to be important to grizzly bears were non-vegetated/grassland types, avalanche chutes, and open slab rock areas. While forest were found to be among the least statistically selected

cover type, it is important to note that nearly half of the radiolocations of marked bears occurred in this type during all seasons. On the East Front, the daytime cover types most important to grizzly bears were closed timber, rock, prairie grassland, and aspen stands.

Denning

Western Montana grizzlies generally spend 5-6 months a year in dens. Most dens are excavated but natural ones can also be used. Den digging can start as early as September or take place just prior to entry in mid-November. Dens are usually dug on steep slopes where wind and topography cause an accumulation of deep snow and where the snow is unlikely to melt during warm periods. Finding an isolated area that will be well covered with a blanket of snow will minimize the escape of body-warmed air and will provide a secure environment for a hibernation period that may last up to six-months. In western Montana, dens typically occur at elevations between 5,900-6,600 feet and at slopes greater than 50% in open and open-timbered areas. Most den sites occur on western, northern, or eastern aspects.

Generally, grizzly bears den by late October to mid-November and emerge in mid-March to Late April. Females with young typically are the first to enter dens and the last to emerge in the spring, while males usually are the last to enter and the first to emerge in the spring. In the Swan Mountains, males have entered their dens as late as mid-December and females with cubs have been known to emerge as late as mid-May. In the Yaak River, male grizzly bears typically enter dens during December with many individuals remaining active until late December.

Security at den sites appears to be an important management consideration, especially if human disturbance occurs near the time of den entry. There has been some concern of the possible effects of snowmobiles on denning bears. This is increased with increasingly powerful snow machines and the practice of "high marking" which could occur in denning habitats. A study in northwestern Montana did not observe any overt effects of snowmobiles within 1.5 miles of dens. The greatest potential impact on bears was during spring when females with cubs were still confined to the vicinity of the den, and also after bears had moved to gentler terrain more suitable to use by snow machines. Predictable denning chronology and the behavioral plasticity bears exhibit toward den and den site characteristics suggest potential human impacts to denning grizzly bears may be mitigated by careful consideration when implementing strategies for human activity.

Home range

In the CYE, adult male grizzly bear life ranges recorded by various USFWS researchers between 1983 and 2004 averaged 457 mi^2 while female life ranges during the same period averaged 204 mi^2. Female offspring generally establish home ranges around their maternal range.

On the East Front, females with cubs were found to restrict movements compared to years when they did not have cubs. The ability to confine activities during years with cubs may depend upon habitat conditions and the distribution of food resources, and may impart survival advantages to these litters.

In the Swan Mountains, core area of home ranges varied by sex and time of year. Core areas for males were larger during the early season relative to the late season. The converse was found for females. The larger core size for males during the early season may be due primarily to increased movements by reproductively active males during the breeding season. The extent of early season movements for females each year depended on whether they had young, and the age of the young. During the late

season male core areas were smaller; a result of more restricted and concentrated foraging behavior. Female core areas were larger during the late season relative to the early season. It is during this season the bears fed extensively on the fruit of several shrubs to gain necessary fat reserves for denning.

Early season core areas tend to be at mid- to high-elevation sites (temperate and sub-alpine zones) where there are a higher density of avalanche chutes, and lower density of high-use roads and total roads. This suggests that during the early season bears are concentrating their use in areas having minimum human disturbance at a time when much of the higher elevation habitat is still covered with snow.

Adult females are the most important cohort for population trend and overall health; therefore considerations of the needs and sensitivities of adult females should guide management. Habitat management emphasis in the NCDE is placed on protection of female grizzly bears, and it seems logical that identification of female core areas should receive high priority for habitat conservation. Seasonal core areas of individual females overlap extensively, suggesting that contiguous blocks of core habitat meeting the annual needs of females could be identified.

Home ranges of grizzly bears in northwestern Montana overlap extensively on a yearly and lifetime basis. However, bears typically utilize the same space at different times. Male home ranges overlap several females to increase breeding potential, but males and females consort only during the brief period of courtship and breeding. Adult male bears whose home ranges overlap seldom use the same habitat at the same time to avoid conflict.

There is movement of grizzly bears across the political border between the U.S. and Canada. Grizzly bears captured south of the international boundary in the Yaak study area of northwest Montana and northern Idaho were monitored crossing into Canada on an annual basis, and bears marked in the U.S. and Canada in the NCDE have also crossed the border in both directions.

Natality

For grizzlies in western Montana, breeding occurs between May and July with cubs born in the den the following winter. The average litter size is two cubs (range 1-4). Reproductive intervals for females average 3 years, and animals that lose young prior to or during the breeding season may come into estrus and breed again that same year. Age when cubs are first produced is generally 5.5 for females (range 4-8 years). Offspring remain with the female 2-4 years before weaning. Grizzly bears are promiscuous. Females can mate with multiple males and have a litter with offspring sired by different males. Males can sire litters with multiple females in a breeding season. Male grizzly bears are sexually mature around 4.5 years of age but larger, dominant males may preclude young adult males from siring many offspring.

The limited reproductive capacity of grizzly bears precludes any rapid increase in the population. Grizzly bears have one of the lowest reproductive rates among terrestrial mammals, resulting primarily from the late age of first reproduction, small average litter size, and the long interval between litters.

Assuming initiation of breeding at 4.5 years, a female grizzly bear would add her first recruitment to the population when she was 5.5 years. The age of second breeding likely would not occur until she is 7.5. Therefore, during the first 10 years of her life, a female grizzly bear is capable of adding only two litters to the total population. If there are litters of two cubs with a 50:50 sex ratio, and a 50% survivorship of young to age 5.5, at best she can replace herself with one breeding age female in the first decade of her life.

Assuming optimum conditions, 50% survivorship to age 5.5, equal sex ratios, and using the oldest documented female weaning her last litter at age 24.5 years, a single female would have the potential capability of adding only three and one-half females to the population during her lifetime. Given a normal rate of mortality for all age classes, a protracted reproductive cycle of 3.5 years to 7 years, and the increasing stresses of habitat encroachment by humans, actual reproductive expectancy is usually far less. Obviously, providing sufficient protection for females is essential to recovery and long-term population management.

Natural Mortality

The causes of natural mortality for grizzly bears are not well known. Bears do kill each other. It is known that adult males kill juveniles and that adults also kill other adults. Parasites and disease do not appear to be significant causes of natural mortality but they may very well hasten the demise of weakened bears. Natural mortality during the denning period is not well documented. Several authors believe some bears die during denning, especially following periods of food shortages. However, few such deaths have been recorded.

Monitoring efforts conducted by USFWS scientists in the CYE, between 1999 and 2001, suggest that eight grizzly bears died of natural causes during this time period. Seven of these eight mortalities involved cubs. The increase in natural mortality beginning in 1999 may be linked to poor food production during 1998-2000. Huckleberry production during these years was about half the 11-year average. Huckleberries are the major source of late summer food for bears in the CYE that enable them to accumulate sufficient fat to survive the denning period and enable females to produce and nurture cubs. Poor nutrition often results in failure to reproduce the following year. Poor food production may also cause females to travel further for food, which may expose cubs to greater risk of mortality from predators or accidental deaths.

In the Swan Mountains during the period 1987-1996, nine grizzly bears died of natural causes. Two causes included an adult female believed to be killed and fed upon by an adult male, and a female accompanied by 2 cubs killed in an avalanche.

Human-Caused Mortality

Upon emergence from the den, bears move considerable distances from high, snow-covered elevations to lower elevations to reach palatable, emerging vegetation on avalanche chutes, or to feed on winter-killed or weakened ungulates on foothill winter ranges. This type of movement often occurs on the Rocky Mountain front region of Montana. Such movement of bears to lower elevations often takes them near areas of human habitation, and may increase the incidence of human/bear conflicts. Similar movement patterns often occur in the fall due to ripening of fruit and berries at lower elevations. This type of movement occurs on the west front of the Mission Mountains in Montana.

There are a variety of human-caused mortalities. Numbers of mortalities and their causes for the NCDE and CYE are presented in Figures 6-9. These can be mistaken identity during legal black bear hunting season, self defense, management removal of food habituated problem bears, collision with vehicles and/or trains, or killing for malicious purposes.

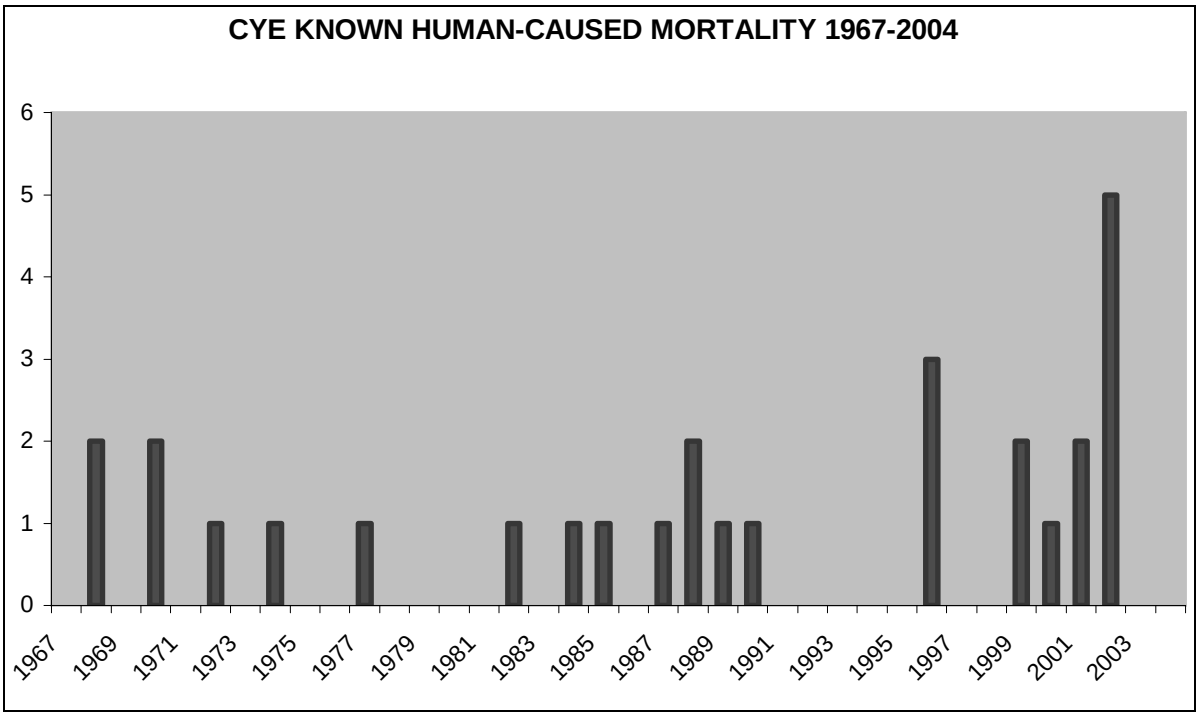

Figure 6. Known human-caused grizzly bear mortality in the Cabinet-Yaak Ecosystem 1967-2004.

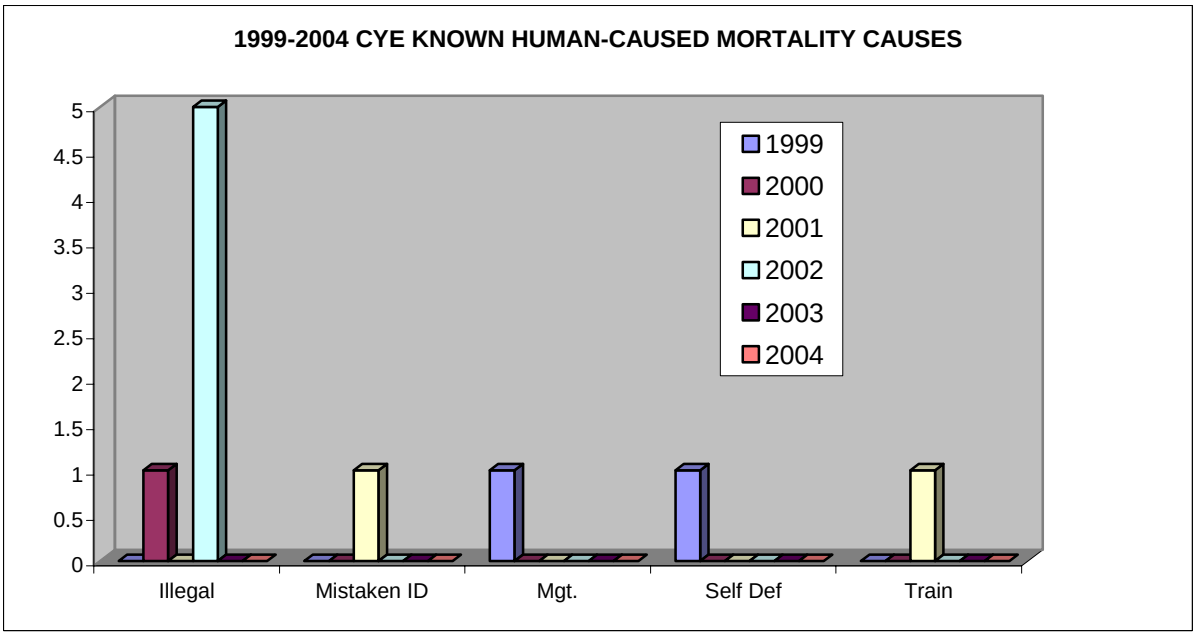

Figure 7. Known human-caused mortality causes in the Cabinet-Yaak Ecosystem 1999-2004

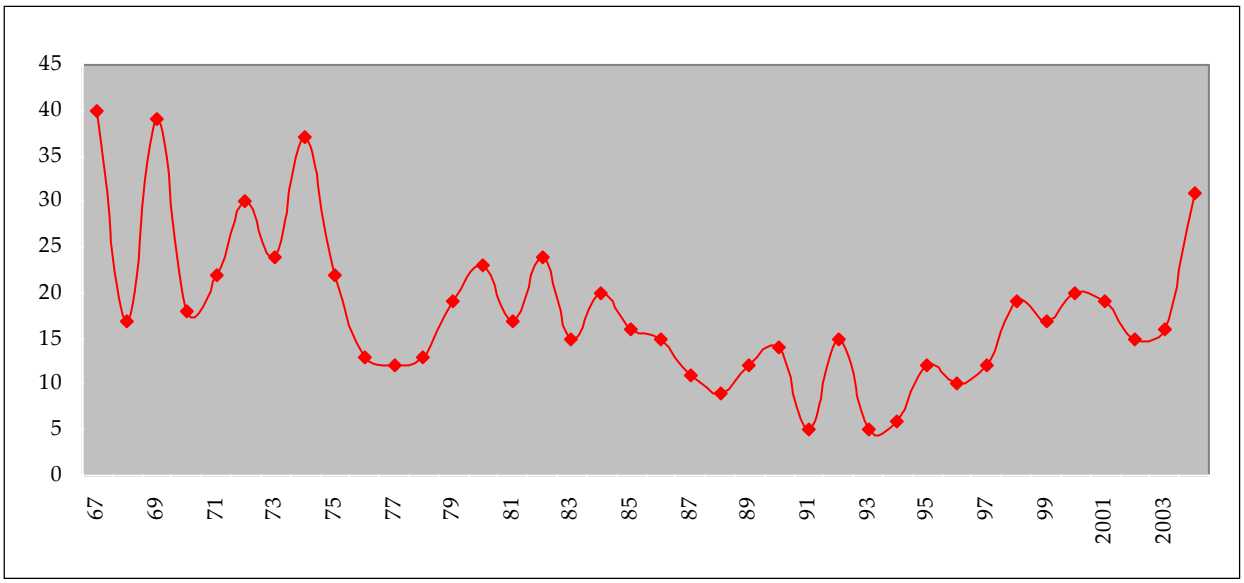

Figure 8. Known human-caused grizzly bear mortality in the Northern Continental Divide Ecosystem 1967 – 2004.

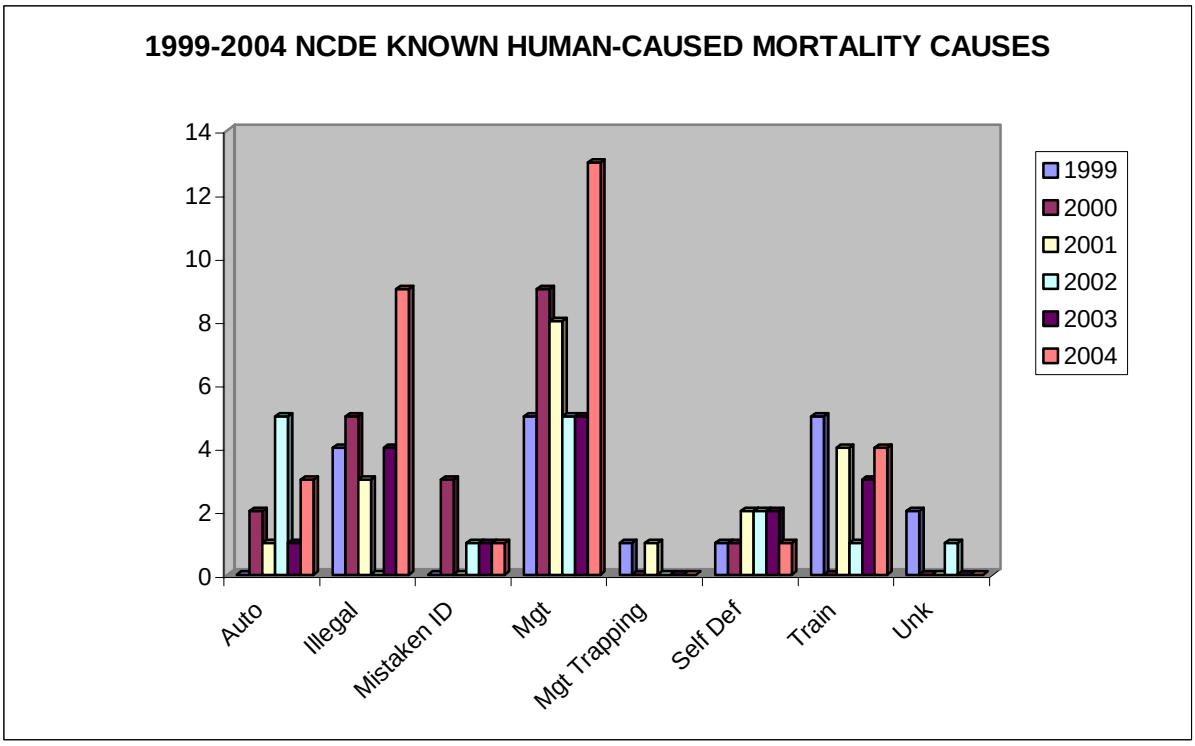

Figure 9. Known human-caused mortality causes in the Northern Continental Divide Ecosystem 1999-2004.

Density

Grizzly bears are long-lived animals that range over extensive geographic areas. These traits make it difficult to census and assess population levels. Furthermore, capture and marking of grizzlies is expensive and dangerous for both researchers and bears. In combination, these factors result in limited sample sizes for statistical analyses. Thus, population estimates and dynamics calculations are often contested. Generally, researchers do not contest the fact that grizzlies have low reproductive rates and that grizzly populations are very susceptible to human impacts. Also recognized is that bear numbers are very sensitive to changes in female survival rates.

As with all other bear populations in the world, it is not possible to determine definitively the actual numbers of bears in western Montana. Any figure will, therefore, be a result of some form of estimation. Density estimates have been, and continue to be, a widely accepted method for estimating grizzly bear populations. This may be changing however. In the past, grizzly bear management programs in the NCDE were based on density estimates (Table 3). These estimates were developed and validated using the best available information. All estimates were developed using very conservative approaches to ensure that the management program in no way negatively impacted the grizzly population. Currently there is a major new effort underway to develop a point population estimate using DNA samples from hair. Results of this effort should be available in 2006 and will allow us to evaluate past density estimates as well as provide a more precise population estimate in the ecosystem.

Table 3. Minimum density estimates for grizzly bears in the NCDE from previous programmatic EISs.

Area	Size (mi^2)	Density (mi^2/bear)	Number of Bears
Red Meadow	215	10-15	14-22
Whitefish	831	18-25	33-46
Glacier National Park	1,583	6-8	198-264
St. Mary	211	10-20	11-21
Badger-Two Medicine	323	27-38	9-12
South Fork Flathead River	1,624	10-13	125-162
East Front	1,119	25-31	36-45
Swan Front	780	20-30	26-39
Mission Mountains	1,044	25-45	23-42
Scapegoat	1,903	56-112	17-34
Total	**9,633**	**14-20**	**492-687**
Total excluding GNP	**8,050**	**19-27**	**294-423**

Status in the NCDE

The Northern Continental Divide recovery zone encompasses about 9,600 mi^2 of northwestern Montana and is one of five areas in the contiguous 48 states where grizzly bears still persist (see Figure 2). Moreover, the area is contiguous to Canadian grizzly bear populations and interchange of bears has been documented. Recent data suggests that bears in the NCDE occupy approximately 37,460 km^2 (14,500 mi^2) of habitat that includes Glacier National Park, parts of the Flathead and Blackfeet Indian Reservations, parts of five national forests (Flathead, Helena, Kootenai, Lewis and Clark, and Lolo), Bureau of Land Management lands, and a significant amount of state and private lands. Encompassed within this region

are four wilderness areas (Bob Marshall, Mission Mountains, Great Bear and Scapegoat), one wilderness study area (Deep Creek North) and one scenic area (Ten Lakes). While not officially designated a wilderness area, the Kootenai National Forest manages the Ten Lakes Scenic Area to preserve its wilderness characteristics.

The grizzly bears in Glacier National Park (GNP) represent the keystone of the NCDE population in northwest Montana, and current estimates indicate more than 200 individuals reside in the area. Because of its proximity to Canadian bear populations, large land area, and high proportion of designated wilderness and national park lands, the NCDE offers some of the best long-term prospects of supporting a viable grizzly bear population among the six areas designated as grizzly bear recovery zones in the U.S.

Grizzly bear distribution in the NCDE has been, and still is, documented through radio-collared animals, female with cubs/young observations, tracks, scats, other sightings, mortality locations, and photographic detection methods. As female grizzly bears with cubs are extremely difficult to observe in the NCDE because of dense forest canopies and thick shrub fields, existing minimum counts for the NCDE are likely inadequate and far below actual population size and as a result do not reflect the true status of this grizzly bear population. Consequently, until now, statistically rigorous grizzly population studies in forested habitat could only be accomplished with radio telemetry. New technology involving DNA identification of hair and scat samples will, however, provide additional information of distribution and population parameters. In the future, population estimates, derived from the 2004 USGS DNA point estimate, will form the base against which trend will be determined.

Recent advances in genetic technology allow identification of species, sex, and individuals from DNA extracted from bear hair and scats without handling bears. With proper survey design and necessary funding, identification of individuals and sex typing data can be used to determine (1) minimum population size, (2) provide a way to measure population trends for both black and grizzly bears, and (3) genetic diversity of the populations. Now that individual bears can be identified from hair and scats, sign surveys to monitor population trend status will be more powerful.

In addition to the DNA-based total population estimate, a program to estimate the trend of the NCDE population has been initiated. Trend monitoring will determine the fate and reproductive status of female grizzly bears, allowing biologists to determine if the population is increasing, decreasing, or is stable. A sample of 25 or more adult female grizzly bears will be radio-collared and monitored into the future on an annual basis. More importantly, the sampling scheme will be designed to minimize bias of the radioed animals towards any one area, and balance bear density with the radioed sample across the area. For example, if 50% of the bears reside outside Glacier National Park, then 50% of all bears collared in the study will be from locations outside the park. This will provide a calculation of population trend with confidence intervals across differing land use patterns.

The DNA-based total population estimate in combination with trend estimates will provide the necessary critical information on the NCDE population to determine how this population is performing and to understand how, or if, management efforts are meeting the needs of this population. The population trend monitoring effort will continue every year to gain the data needed to update trend information. This is the same population trend monitoring system that is currently in place in the Yellowstone ecosystem. Mortality levels and relationship to recovery criteria presented in the 1993 Grizzly Bear Recovery Plan are presented in Tables 4 and 5.

Table 4. NCDE recovery zone grizzly bear population parameters including minimum unduplicated counts of females with cubs (FWCs), distribution of females with young and known human-caused mortality, 1997-2004.[1]

Year	Annual Undup. FWCs (Out/In GNP)	Annual Human Caused Adult Female Mortality	Annual Human Caused All Female Mortality	Annual Human Caused Total Mortality	4% Total Human Caused Mortality Limit	30% All Female Human Caused Mortality Limit	Total Human Caused Mortality 6 Year Average	Female Human Caused Mortality 6 Year Average
1997	13 (9/4)	1	5	12	14.6	4.4	10.0 (60/6)	4.7 (28/6)
1998	33 (22/11)	3	8	19	13.9	4.2	10.7 (64/6)	4.5 (27/6)
1999	18 (13/5)	3	4	17	13.9	4.2	12.7 (76/6)	5.0 (30/6)
2000	24 (13/11)	7	9	19	15.0	4.5	14.8 (89/6)	6.0 (36/6)
2001	26 (15/11)	6	9	19	12.7	3.8	16.0 (96/6)	6.5 (39/6)
2002	23 (16/7)	3	4	15	13.9	4.2	16.8 (101/6)	6.5 (39/6)
2003	19 (11/8)	4	7	16	12.9	3.9	17.5	6.8
2004	21 (8/13)	5	21	34	12.0	3.6	20.0	9.0

[1] data from USFWS Grizzly Bear Coordinator (Chris Servheen, pers. comm.) and FWP internal reports.

Table 5. Status of the Northern Continental Divide Ecosystem recovery zone during 1999-2004 in relation to demographic recovery targets from the grizzly bear recovery plan (USFWS 1993).

Recovery Criteria	Target	1999-2004
Females w/cubs (6-yr average)	22	21.8
Inside GNP (6-yr avg)	10	9.2 (55/6)
Outside GNP (6-yr avg)	12	12.7 (76/6)
Human Caused Mortality limit (4% of minimum estimate)	12	20
Female Human Caused mortality limit (30% of total mortality)	3.6	9.0
Distribution of females w/young (Missions occupied)	21 of 23	22 of 23

Status in the CYE

The Cabinet-Yaak recovery zone encompasses about 2,600 mi^2 of northwest Montana and northern Idaho and lies directly to the south of Canada (see Figure 2). The Kootenai River bisects this area with the Cabinet Mountains portion to the south and the Yaak River portion to the north. The degree of grizzly bear movement between the two portions is unknown but thought to be minimal and has not been documented to date. There is, however, evidence of movement between the Yaak area and adjacent portions of Canada. To obtain information on population status and habitat needs of grizzlies using the area, FWP initiated a study, conducted by Kasworm and Manley in cooperation with the USFWS and USFS, in the Cabinet Mountains in 1983. More recently, the USFWS, in cooperation with the USFS and

FWP, initiated a long-term study beginning in 1989. Objectives of the 1989 study have focused on (i) testing grizzly bear population augmentation in the Cabinet Mountains to determine if transplanted bears will remain in the area of release and ultimately contribute to the population through reproduction and (ii) conducting research and monitoring efforts. During this time period, population estimates of grizzlies have been gathered from observations of bears and bear sign (tracks, digs, etc.), from capture and radio-collar operations, and from hair sampling for DNA analysis.

In order to determine if transplanted bears would remain in the area of release and ultimately contribute to the population through reproduction, a population augmentation program was initiated in the early 1990s. As part of this program, four young female grizzly bears, with no history of conflicts with humans, were captured in the Flathead River Valley of British Columbia and released in the Cabinet Mountains of northwest Montana. One of the transplanted bears produced a cub the following spring however, the animal had likely bred prior to translocation and did not satisfy the criteria for reproduction with native males. This female, and presumably her cub, died of unknown causes later that year. The remaining three bears were monitored until their collars fell off. Three of four transplanted bears remained within the target area for more than one year. In addition, in 2005, FWP transplanted an additional female.

DNA analysis is currently being used to determine the fate of the three remaining bears transplanted in the 1990s. The program utilizes genetic information from hair-snagging and remote camera observations to attempt to identify transplanted bears or their offspring living in the Cabinet Mountains. This project provides a minimum estimate of the number of bears inhabiting the area, sex ratio of captured bears, and relatedness and genetic diversity measures of captured bears. During 2004, hair from one of the three remaining translocated females was collected at a hair snag site and identified by DNA analysis. Results also indicate that this female has reproduced, and her offspring have also reproduced in the area.

Using only animals identified during 1997-2004 (38) less known mortality (16), USFWS scientists suggest a population of at least 22 individuals. This estimate is conservative because study personnel observations alone would not likely sample all bears in the area, some sightings classified as the same animal may represent different additional animals, and the study has received several credible public reports of additional bears that are not included in this analysis. Since 1989 there have been credible sightings of bears in all 8 BMUs that make up the Yaak portion of the recovery area with sightings of females with young in 6 BMUs. About half of the credible observations of females with young in these BMUs did not appear to come from marked bears. The actual number of unmarked females represented is unknown. A population estimate of 20-30 grizzly bears for the entire Yaak portion of the recovery zone would appear reasonable.

The Cabinet Mountains population was estimated to be 15 bears or fewer in 1988. There is insufficient data to dramatically change that estimate, but since 1988 the population was augmented with 4 young females, and there have been credible sightings of individual bears in all 14 BMUs that make up the Cabinet Mountains with sightings of females with young in 7 BMUs since the completing of transplants. Based on these data, Kasworm and colleagues conservatively estimate the population of the CYE at 30-40 grizzly bears.

In summary, the current trend for the CYE appears to be that the population is declining slightly. Mortality levels in the populations and relationship of the population to recovery criteria presented in the 1993 recovery plan are presented in Tables 6 and 7.

Table 6. Cabinet-Yaak recovery zone grizzly bear population parameters including minimum unduplicated counts of females with cubs (FWCs) and known human-caused mortality, 1988-2004.[1]

Year	Annual Undupl. FWCs	Annual Human Caused Adult Female Mortality	Annual Human Caused All Female Mortality	Annual Human Caused Total Mortality	4% Total Human Caused Mortality Limit[1]	30% All Female Human Caused Mortality Limit[2]	Total Human Caused Mortality 6 Year Average	Female Human Caused Mortality 6 Year Average
1988	1	1	1	1	0	0	--	--
1989	0	0	1	1	0	0	--	--
1990	1	0	0	1	0	0	--	--
1991	1	0	0	0	0	0	--	--
1992	1	0	0	0	0	0	--	--
1993	2	0	0	1	0.9	0.3	0.5	0.3
1994	1	0	0	0	0.9	0.3	0.3	0.2
1995	1	0	0	0	0.9	0.3	0.2	0
1996	1	0	0	1	0.7	0.2	0.2	0
1997	3	0	0	1	1.2	0.4	0.3	0
1998	0	0	0	0	0.9	0.3	0.3	0
1999	0	0	0	1	0.7	0.2	0.5	0
2000	2	0	1	1	0.5	0.1	0.7	0.2
2001	1	1	2	2	0.5	0.1	1.0	0.5
2002	4	1	4	5	1.2	0.4	1.7	1.2
2003	2	0	0	0	1.2	0.4	1.5	1.2
2004	1	0	0	0	1.4	0.4	1.5	1.2

[1] Data from USFWS Grizzly Bear Recovery Plan (1993) and Cabinet-Yaak grizzly bear recovery area 2004 research and monitoring progress report (Kasworm et al, 2005).

[2] Presently, grizzly bear numbers so small in this ecosystem that mortality goal shall be minimal known human-caused mortalities.

Table 7. Status of the Cabinet-Yaak recovery zone during 1999-2004 in relation to demographic recovery targets from the grizzly bear recovery plan (USFWS 1993).

Recovery Criteria	Target	1999-2004
Females w/cubs (6-yr average)	6.0	1.7 (10/6)
Human Caused Mortality limit (4% of minimum estimate)	1.4	1.5 (6 yr avg)
Female Human Caused mortality limit (30% of total mortality)	0.4	1.2 (6 yr avg)
Distribution of females w/young	18 of 22	12 of 22